AMENDMENTS TO THE CLAIMS

1. (Currently amended) A method for correcting an image frame, the method comprising:

receiving a first image frame of a scene from a digital sensor;

receiving a first plurality of image frames from the digital sensor exposed to a dark current ~~light below a first predefined luminance~~ level;

receiving a second plurality of image frames from the digital sensor exposed to a reference intensity ~~light above a second predefined luminance~~ level;

computing a difference between the first plurality of images and the second plurality of images over a stable region of interest; and

using the difference to correct ~~correcting~~ the first ~~received~~ image frame for light scattering. ~~based on the received plurality of image frames exposed to light below the first predefined luminance level and the plurality of image frames exposed to light above the second predefined luminance level.~~

2. (Currently amended) A method for correcting an image frame, the method comprising:

receiving a first image frame from a digital sensor;

receiving a plurality of image frames from the digital sensor exposed to light below a first predefined luminance level;

receiving a plurality of image frames from the digital sensor exposed to light above a second predefined luminance level; and

correcting the first received image frame based on the received plurality of image frames exposed to light below the first predefined luminance level and the plurality of image frames exposed to light above the second predefined luminance level;

~~The method of claim 1,~~ wherein each image frame includes a plurality of frame units and correcting includes [[:]] calculating a mean value for each frame unit of the plurality of image frames exposed to light below the first predefined luminance level; calculating a mean value for each frame unit of the plurality of image frames exposed to light above the second predefined luminance level; generating a second image frame by

subtracting the calculated mean value for each frame unit of the plurality of image frames exposed to light below the first-predefined luminance level from the corresponding frame unit in the first image frame; generating a third image frame by subtracting the calculated mean value for each frame unit of the plurality of image frames exposed to light below the first predefined luminance level from the calculated mean value for each corresponding frame unit of the plurality of image frames exposed to light above the second predefined luminance level; generating a fourth image frame by dividing each frame unit in the second image frame from the corresponding frame unit in the third image frame; calculating an average of frame units within a predefined center section of the third image frame; and generating a fifth image frame by multiplying each frame unit in the fourth image frame by the calculated average of the center section frame units, thereby producing a corrected image frame of the received image frame.

3. (Original) The method of claim 2, wherein generating a fifth image frame includes adding a first predefined constant value.

4. (Original) The method of claim 3, wherein the first constant value is around 150 based on sensor testing and characterizations.

5. (Original) The method of claim 1, wherein receiving the image frames includes enhancing the image frames based on characteristics of the digital sensor.

6. (Currently amended) A method for correcting an image frame, the method comprising:

receiving a first image frame from a digital sensor;

receiving a plurality of image frames from the digital sensor exposed to light below a first predefined luminance level;

receiving a plurality of image frames from the digital sensor exposed to light above a second predefined luminance level; and

correcting the first received image frame based on the received plurality of image frames exposed to light below the first predefined luminance level and the

plurality of image frames exposed to light above the second predefined luminance level;

wherein receiving the image frames includes enhancing the image frames based on characteristics of the digital sensor; and

~~The method of claim 5,~~ wherein enhancing the image frames includes [[:]] determining a region of interest based on a masked region of the digital sensor; determining a standard deviation of the frame units for the determined region of interest; determining a threshold value based on the determined standard deviation; determining a mean of the frame units in the determined region of interest that are below the determined threshold value; and generating enhanced image frames based on the determined mean of the frame units.

7. (Original) The method of claim 6, wherein generating enhanced image frames includes: determining a mean difference value based on the determined mean of the frame units and a predefined coefficient; and adding the determined mean difference value to each frame unit of the corresponding image frame.

8. (Original) The method of claim 7, wherein determining a mean difference value includes subtracting the determined mean of the frame units from 150.

9. (Original) The method of claim 6, wherein determining a threshold value includes multiplying the determined standard deviation by a second constant value.

10. (Original) The method of claim 9, wherein the second constant value is around 6.

11. (Original) The method of claim 5, wherein receiving the first image frame includes removing light scattering effects from a portion of the enhanced image frame based upon light scattering properties.

12. (Original) The method of claim 11, wherein the light scattering properties include light scattering effects of the frame units upon all other frame units based upon distance between the respective frame units.

13. (Original) The method of claim 12, wherein removing light scattering effects includes:

a) calculating an average value of frame units within the determined region of interest;

b) generating a second image frame and by removing the calculated average value from each of the frame units of the enhanced first image frame;

c) separating the second image frame into a plurality of subarrays;

d) generating a total for each subarray by adding all the frame units of the respective subarray;

e) determining a distance of a frame unit of the second image frame from one of the subarrays;

f) determining the light scattering effect of the subarray upon the frame unit based upon the determined distance of the frame unit from the subarray and predetermined light scattering characteristics;

g) generating a subarray light scattering effect by multiplying the determined light scattering effect by the generated total of the associated subarray;

h) repeating e)-g) for all the subarrays;

i) generating a subarray effects total by adding all the generated subarray light scattering effects;

j) generating a final frame unit by subtracting the generated subarray effects total from the respective frame unit; and

k) repeating e)-j) for all the frame units of the second image frame.

14. (Currently amended) A system for correcting an image frame produced by a digital sensor, the system comprising [[:]] a processor programmed ~~including: a first component configured~~ to receive a first image frame from the digital sensor, a plurality of image frames exposed to light below a first predefined luminance level, and a plurality of image frames exposed to light above a second predefined luminance level; and ~~a second component configured~~ to correct the first image frame for light scattering based on a difference between the received plurality of image frames exposed to light below the first predefined luminance level and the plurality of image frames exposed to light above the second predefined luminance level~~; and an output device configured to output the corrected image frame~~.

15. (Currently amended) The system of claim 14, wherein each image frame includes a frame unit and wherein the ~~second component includes: a third component configured~~the processor is programmed to:

calculate a mean value for each frame unit of the plurality of image frames exposed to light below the first predefined luminance level; ~~a fourth component configured to~~

calculate a mean value for each frame unit of the plurality of image frames exposed to light above the second predefined luminance level; ~~a fifth component configured to~~

generate a second image frame by subtracting the calculated mean value for each frame unit of the plurality of image frames exposed to dark from the corresponding frame unit in the first image frame; ~~a sixth component configured to~~

generate a third image frame by subtracting the calculated mean value for each frame unit of the plurality of image frames exposed to light below the first predefined luminance level from the calculated mean value for each corresponding frame unit of the plurality of image frames exposed to light above the second predefined luminance level; ~~a seventh component configured to~~

generate a fourth image frame by dividing each frame unit in the second image frame from the corresponding frame unit in the third image frame; ~~an eighth component configured to~~

calculate an average of frame units within a predefined center section of the third image frame; and ~~a ninth component configured to~~

generate a fifth image frame by multiplying each frame unit in the fourth image frame by the calculated average of the center section frame units, thereby producing a corrected image frame of the received image frame.

16. (Cancelled)

17. (Cancelled)

18. (Currently amended) The system of claim 14, wherein the ~~first component is configured to enhance the~~ image frames are enhanced based on characteristics of the digital sensor.

19. (Currently amended) The system of claim 18, wherein ~~the first component is configured to enhance~~ enhancing the image frames [[by]] includes: determining a region of interest based on a masked region of the digital sensor; determining a standard deviation of the frame units for the determined region of interest; determining a threshold value based on the determined standard deviation; determining a mean of the frame units in the determined region of interest that are below the determined threshold value; and generating enhanced image frames based on the determined mean of the frame units.

20. (Currently amended) The system of claim 19, wherein ~~the first component is configured to generate the enhanced image frames by: determining~~ a mean difference value based on the determined mean of the frame units and a predefined coefficient is computed; and ~~adding~~ the ~~determined~~ mean difference value is added to each frame unit of the corresponding image frame.

21. (Original) The system of claim 20, wherein the predefined coefficient is about 150 based on sensor testing and characterizations.

22. (Currently amended) The system of claim 19, wherein ~~the first component is configured to determine a~~ the threshold value is determined by multiplying the determined standard deviation by a second constant value.

23. (Original) The system of claim 22, wherein the second constant value is around 6.

24. (Currently amended) The system of claim 18, wherein ~~the first component is configured to remove~~ light scattering effects are removed from the enhanced image frame based upon light scattering properties.

25. (Original) The system of claim 24, wherein the light scattering properties include light scattering effects of the frame units upon all other frame units based upon the distance between the respective frame units.

26. (Currently amended) The system of claim 25, wherein ~~the third component is configured to remove~~ removing the light scattering effects [[by]] includes:

a) calculating an average value of frame units within the determined region of interest;

b) generating a second image frame by removing the calculated average value from each of the frame units of the enhanced first image frame;

c) separating the second image frame into a plurality of subarrays;

d) generating a total for each subarray by adding frame units of the respective subarray;

e) determining a distance of a frame unit of the second image frame from one of the subarrays;

f) determining the light scattering effect of the subarray upon the frame unit based upon the determined distance of the frame unit from the subarray and predetermined light scattering characteristics;

g) generating a subarray light scattering effect by multiplying the determined light scattering effect by the generated total of the associated subarray;

h) repeating e)-g) for all the subarrays;

i) generating a subarray effects total by adding all the generated subarray light scattering effects;

j) generating a final frame unit by subtracting the generated subarray effects total from the respective frame unit; and

k) repeating e)-j) for all the frame units of the second image frame.

27. (Currently amended) An article comprising a computer readable medium and a [[A]] computer-program product residing on [[a]] the computer readable medium for correcting an image frame produced by a digital sensor, including: ~~the computer-program product comprising: a first computer-program code component configured to receive~~

receiving a first image frame ~~from the digital sensor~~, a plurality of image frames exposed to light below a first predefined luminance level, and a plurality of image frames exposed to light above a second predefined luminance level; and ~~a second computer-program code component configured to correct~~

correcting the first image frame for light scattering based on a difference between the received plurality of image frames exposed to light below the first predefined luminance level and the plurality of image frames exposed to light above the second predefined luminance level, ~~; and a third computer-program code component configured to output the corrected image frame on an output device.~~

28. (Currently amended) The ~~computer-program product~~ article of claim 27, wherein each image frame includes a frame unit and wherein correcting the first image includes:

calculating ~~the second computer-program code component includes: a fourth computer-program code component configured to calculate~~ a mean value for each frame unit of the plurality of image frames exposed to light below the first predefined luminance level; ~~a fifth computer-program code component configured to calculate~~

calculating a mean value for each frame unit of the plurality of image frames exposed to light above the second predefined luminance level; ~~a sixth computer-program code component configured to generate~~

generating a second image frame by subtracting the calculated mean value for each frame unit of the plurality of image frames exposed to light below the first

predefined luminance level from the corresponding frame unit in the first image frame; ~~a seventh computer program code component configured to generate~~

generating a third image frame by subtracting the calculated mean value for each frame unit of the plurality of image frames exposed to light below the first predefined luminance level from the calculated mean value for each corresponding frame unit of the plurality of image frames exposed to light the second predefined luminance level; ~~an eighth computer program code component configured to generate~~

generating a fourth image frame by dividing each frame unit in the second image frame from the corresponding frame unit in the third image frame; ~~a ninth computer program code component configured to calculate~~

calculating an average of frame units within a predefined center section of the third image frame; and ~~a tenth computer program code component configured to generate~~

generating a fifth image frame by multiplying each frame unit in the fourth image frame by the calculated average of the center section frame units, thereby producing a corrected image frame of the received image frame.

29. (Canceled)

30. (Canceled)

31. (Currently amended) The article ~~computer program product~~ of claim 27, wherein the ~~first computer program code component is configured to enhance the~~ image frames is enhanced based on characteristics of the digital sensor.

32. (Currently amended) The article ~~computer program product~~ of claim 31, wherein ~~the first computer program code component is configured to enhance~~ enhancing the image frames [[by:]] includes determining a region of interest based on a masked region of the digital sensor; determining a standard deviation of the frame units for the determined region of interest; determining a threshold value based on the determined standard deviation; determining a mean of the frame units in the determined region of interest that are below the determined

threshold value; and generating enhanced image frames based on the determined mean of the frame units.

33. (Currently amended) The ~~computer-program product~~article of claim 32, wherein ~~the first computer program code component is configured to generate the enhanced image frames by: determining~~ a mean difference value based on determined mean of the frame units and a predefined coefficient is added ~~; and adding the determined mean difference value~~ to each frame unit of the corresponding image frame.

34. (Currently amended) The ~~computer-program product~~ article of claim 33, wherein the predefined coefficient is about 150 based on sensor testing and characterizations.

35. (Currently amended) The article ~~computer-program product~~ of claim 32, wherein ~~the first computer program code component is configured to determine a~~ the threshold value is determined by multiplying the determined standard deviation by a second constant value.

36. (Currently amended) The computer-program product of claim 35, wherein the second constant value is around 6.

37. (Currently amended) The article ~~computer-program product~~ of claim 27, wherein ~~the first computer program is further configured to remove~~ light scattering effects are removed from the enhanced image frame based upon light scattering properties.

38. (Currently amended) The ~~computer-program product~~ article of claim 37, wherein the light scattering properties include light scattering effects of the frame units upon all other frame units based upon distance between the respective frame units.

39. (Currently amended) The ~~computer program product~~article of claim 38, wherein ~~the twelfth computer program code component is configured to remove~~removing the light scattering effects [[by]] includes:

a) calculating an average value of frame units within the determined region of interest;

b) generating a second image frame by removing the calculated average value from each of the frame units of the enhanced first image frame;

c) separating the second image frame into a plurality of subarrays;

d) generating a total for each subarray by adding frame units of the respective subarray;

e) determining a distance of a frame unit of the second image frame from one of the subarrays;

f) determining the light scattering effect of the subarray upon the frame unit based upon the determined distance of the frame unit from the subarray and predetermined light scattering characteristics;

g) generating a subarray light scattering effect by multiplying the determined light scattering effect by the generated total of the associated subarray;

h) repeating e)-g) for all the subarrays;

i) generating a subarray effects total by adding all the generated subarray light scattering effects;

j) generating a final frame unit by subtracting the generated subarray effects total from the respective frame unit; and

k) repeating e)-j) for all the frame units of the second image frame.

40. (Original) A method for removing light scattering effects from an image frame generated by a digital sensor, the method comprising:

a) receiving a first image frame from the digital sensor;

b) calculating an average value of frame units within a predetermined region of interest of the received image frame;

c) generating a second image frame by removing the calculated average value from each of the frame units of the first image frame;

d) separating the second image frame into a plurality of subarrays;

e) generating a total for each subarray by adding frame units of the respective subarray;

f) determining a distance of a subarray from a frame unit;

g) determining light scattering effects based upon the determined distance and predetermined light scattering characteristics;

h) generating a subarray light scattering effect by multiplying the determined light scattering effect by the generated total of the associated subarray;

i) repeating f)-h) for processing all the subarrays;

j) generating a subarray effects total by adding all the generated subarray light scattering effects;

k) generating a final frame unit by subtracting the generated subarray effects total from the respective frame unit; and

l) repeating f)-k) for processing all the frame units of the second image frame.

41. (Currently amended) A system for removing light scattering effects from an image frame generated by a digital sensor, the system comprising [[:]] a processor including:

a first component configured to receive a first image frame from the digital sensor, [[;]] a plurality of image frames exposed to light below a first predefined luminance level, and a plurality of image frames exposed to light above a second predefined luminance level;

a second component configured to calculate an average value of frame units within a predetermined region of interest of the first image frame;

a third component configured to generate a second image frame by removing the calculated average value from each of the frame units of the first image frame;

a fourth component configured to separate the second image frame into a plurality of subarrays;

a fifth component configured to generate a total for each subarray by adding frame units of the respective subarray;

a sixth component configured to determine a distance of a frame unit of the second image frame from one of the subarrays;

a seventh component configured to determine the light scattering effect of the subarray upon the frame unit based upon the determined distance of the frame unit from the subarray and predetermined light scattering characteristics;

an eighth component configured to generate a subarray light scattering effect by multiplying the determined light scattering effect by the generated total of the associated subarray;

a ninth component configured to return to the sixth component until all the subarrays have been analyzed;

a tenth component configured to generate a subarray effects total by adding all the generated subarray light scattering effects;

an eleventh component configured to generate a final frame unit by subtracting the generated subarray effects total from the respective frame unit; and

a twelfth component configured to return to the sixth component for processing all the frame units of the second image frame. ~~; and an output device configured to output the result of the twelfth component.~~

42. (Currently amended) An article comprising a computer readable medium and a [[A]] computer-program product residing on [[a]] the computer readable medium for removing light scattering effects from an image frame generated by a digital sensor, the computer-program product ~~comprising~~ including:

a first component configured to receive a first image frame from the digital sensor; a plurality of image frames exposed to light below a first predefined luminance level, and a plurality of image frames exposed to light above a second predefined luminance level;

a second component configured to calculate an average value of frame units within a predetermined region of interest of the first image frame;

a third component configured to generate a second image frame by removing the calculated average value from each of the frame units of the first image frame;

a fourth component configured to separate the second image frame into a plurality of subarrays;

a fifth component configured to generate a total for each subarray by adding frame units of the respective subarray;

a sixth component configured to determine a distance of a frame unit of the second image frame from one of the subarrays;

a seventh component configured to determine the light scattering effect of the subarray upon the frame unit based upon the determined distance of the frame unit from the subarray and the light scattering effects;

an eighth component configured to generate a subarray light scattering effect by multiplying the determined light scattering effect by the generated total of the associated subarray;

a ninth component configured to return to the sixth component for all the subarrays;

a tenth component configured to generate a subarray effects total by adding all the generated subarray light scattering effects;

an eleventh component configured to generate a final frame unit by subtracting the generated subarray effects total from the respective frame unit; and

a twelfth component configured to return to the sixth component for processing all the frame units of the second image frame. [[; and]]

~~a thirteenth component configured to output the result of the twelfth component to an output device.~~

43. (Canceled)